REMARKS/ARGUMENTS

Claims 19-31 and 33-34 are active in this application, claims 1-18 and 32 having been cancelled.

The present invention relates to a method for providing antimicrobial properties to a composite material, regardless of the actual compositional makeup of the composite material. The present method provides several important improvements and advantages compared to conventional methods for antimicrobial treatment.

(I). the present method provides the ability to complete the treatment using a drying process at temperatures of no more than 90°C. This is a critical difference relative to the art. In particular, the methods for providing antimicrobial treatments described in the various references cited by the Examiner indicate that significantly higher temperatures are required to effect antimicrobial treatment on an article, with temperatures being typically on the order of 130°C or higher. This is often followed by a heat treatment at even higher temperatures. That is NOT the case in the present invention. In fact, the present invention requires maintaining the temperature of the drying step to no more than 90°C. Applicants have found that by maintaining the temperature at no more than 90°C, it is still possible to dry the item, while permitting the antimicrobial agent to dry on the surface of the article, reacting NOT so much with the article's surface, but rather reacting primarily with itself to form essentially a coating on the surface. This coating provides the antimicrobial properties which are long lived.

(II). Further, the present invention provides the ability to treat essentially ANY surface, including surfaces such as glass or surfaces that contain no functional groups with which the antimicrobial agent can react.

(III). The present invention also provides the ability to reuse the spent treatment liquid to treat multiple items sequentially. Conventionally, when articles are treated for

antimicrobial properties, the spent liquid has been discarded. That is not necessary with the present invention, as the spent liquid contains considerable quantities of the antimicrobial agent still present, and requires no special treatment of the spent liquid for its reuse.

(IV). The present invention provides antimicrobial protection which works on contact, which means that the composite yarns/fabrics/articles treated with the present invention method have antimicrobial protection against essentially all microorganisms, even those such as methicillin resistant Streptococcus aureus (MRSA) and others which have mutated to be resistant to conventional antimicrobial treatments. (see attached Rule 1.132 Declaration providing test results showing the breadth of organisms that can be protected against, as well as the long-lasting nature of the treatment. The preferred embodiment of the present invention method provides a coating on the yarn/fabric/article having the organic antimicrobial agent possessing a long chain hydrocarbon group which acts like a "spike", penetrating the cell wall of the microorganisms and thus killing them on contact. Conventional antimicrobial agents typically act otherwise, by leaching the active agent which enters the cell and affects the DNA of the microorganism, disrupting reproduction. This requires the microorganism to undergo at least one round of cell division before the microbe is killed.

The rejection of claims 1-18 over Omura has been obviated by cancelation of those claims.

The Examiner has rejected claims 19-31 and 33-34 under 35 U.S.C. 103 over Omura, in view of Smith III. Neither of these references disclose or suggest a process to make an antimicrobially protected product under the conditions of the present invention. In fact, Omura discloses the application of their antimicrobial agent to a cloth, followed by drying at 135°C, and further heat treatment at 165°C for 2 minutes (see Examples 1-3 bridging paragraphs 11 and 12). Omura further discloses at column 8, lines 13-17 that their treated

fabric is dried at temperatures from 100-150°C. However, the present invention requires that the drying step be at temperatures from 50-90°C. This provides two advantages. Namely this provides the present invention antimicrobial the ability to form the above noted coating on the fiber/fabric/article and permits the process to be performed under significantly milder conditions, suitable even for performing by a consumer in a household washer and dryer.

Smith III cannot overcome the deficiencies of Omura, since Smith specifically requires that their treated fabric be dried at a temperature of 320-420°F (160-215°C!). Further, the only articles actually tested by Smith III are flame retardant polyester fabrics, NOT composite products. The only examples provided by Smith which use an antimicrobial agent are Examples 2, 4, 6 and 8, which require temperatures for drying of from 375°F to 380°F. That cannot suggest the mild drying conditions of the present invention!

Even if one of ordinary skill were to combine the teachings of the two references, it would be expected that in order to use the antimicrobial agent of Smith III, one would have to use the high drying temperatures of Smith III in order to have the antimicrobial become affixed to the article and actually work. Further, there is nothing within Smith III to suggest that their antimicrobial agent would work on a composite product.

There is nothing within the two references to suggest that one could perform a method as required in the present invention, requiring a drying temperature of the treated yarn/fabric/article of from 50-90°C, and expect to obtain not only antimicrobial treatment, but also such treatment that would last for many, many wash cycles. The present invention method provides the ability to readily make any yarn/fabric/article antimicrobial under conditions mild enough to be performed at home by the consumer using conventional washer and dryer equipment. (Applicants note that the process can also be performed in an industrial setting using much milder conditions, making the work environment for the employee much more pleasant, since the much hotter temperatures of the prior art are not required!).

Applicants provide herewith a Rule 1.132 Declaration showing that on using the antimicrobial agent of the present invention as claimed in claim 19, on a fabric made from a composite yarn containing a core of fiberglass and ultra high molecular weight polyethylene and two wrap layers of polyester, with a drying temperature of 90C or less, the resulting treated fabric provides surprisingly excellent antimicrobial results, against divergent organisms such as staphylococcus aureus and methicillin resistant staphylococcus aureus (MRSA) (both bacteria), and aspergillus niger (a fungus). Further, the results show that the antimicrobial protection remains at a high level even after repeated wash/dry cycles.

The resulting improvements in antimicrobial properties are decidedly superior to that reported by Omura in Table 4, where the best results for their treated fabrics were only an 80-97% bacteria loss after washing, as compared to the present invention which provides >99.99% microorganism loss after washing and drying, even >99% after repeated washing and drying. Accordingly, one of ordinary skill would not expect to be able to use the antimicrobial agent of Smith III under such mild treatment conditions (which are not actually disclosed by Omura, but which the Examiner states are "close") and obtain the surprising high antimicrobial properties shown in the present invention. As such, the references cannot combine to render the present invention obvious and the rejections should be withdrawn.

Applicants submit that the application is now in condition for allowance and early notification of such action is earnestly solicited.

Respectfully submitted,

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